

OCCSE4002: Social Network Analysis (PE – VI)

Description:

This course, OCCSE4002: Social Network Analysis, is offered by SWAYAM as noc24_cs90—Social Network Analysis.

URL: https://onlinecourses.nptel.ac.in/noc24_cs90/preview

Credits and Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	3	2	5	4
Marks	100	50	150	

* Practical component is offered by CHARUSAT

About this course:

Networks are a fundamental tool for modeling complex social, technological, and biological systems. Coupled with the emergence of online social networks and large-scale data availability in social sciences, this course focuses on the analysis of massive networks which provide many computational, algorithmic, and modeling challenges. The course will cover research on the structure and analysis of such large networks and on models and algorithms that abstract their basic properties. We will explore how to practically analyze large-scale network data and how to reason about it through models for network structure and evolution. Topics covered in this course are how information spreads through society; robustness and fragility of networks; algorithms for the World Wide Web; prediction and recommendation in online social networks; representation learning for large networks; etc.

PREREQUISITES: Python programming, Probability and Statistics, Machine Learning

INDUSTRY SUPPORT: Any social media company, E-commerce company, etc

Course Layout:

Week 1: Introduction ; Tutorial 1: Introduction to Python/Colab ; Tutorial 2: Introduction to NetworkX - Part I

Week 2: Network Measures ; Tutorial 3: Introduction to NetworkX - Part II

Week 3: Network Growth Models

Week 4: Link Analysis

Week 5: Tutorial 4: Graph Visualization Tools ; Community Detection - Part I

Week 6: Community Detection - Part II

Week 7: Link Prediction

Week 8: Cascade Behavior and Network Effects

Week 9: Anomaly Detection

Week 10: Introduction to Deep Learning ; Graph Representation Learning - Part I

Week 11: Graph Representation Learning - Part II ; Tutorial: Coding on Graph Representation Learning

Week 12: Applications and Case Studies ; Conclusion

Course Outcome (COs):

At the end of the course, the students will be able to

CO1	Understand the fundamentals of network analysis, including graph theory, key concepts such as nodes, edges, and network structures, and their relevance in real-world applications.
CO2	Apply Python and the NetworkX library to model, analyze, and visualize networks, demonstrating practical proficiency in handling graph-based data.
CO3	Analyze and implement network growth models and link analysis techniques, evaluating their impact on network structure and behavior.
CO4	Apply community detection methods and anomaly detection techniques to identify patterns and outliers in complex networks, and assess their effectiveness in real-world datasets.
CO5	Understand and implement graph representation learning techniques using deep learning models, and apply these methods to enhance performance in network-related tasks such as link prediction and node classification.

Course Articulation Matrix:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO 1	2	3	2	1	2	2	1	1	1	2	1	1	2	1
CO 2	3	2	3	2	3	1	2	1	2	1	2	2	1	2

CO 3	3	3	3	2	2	1	2	2	2	2	1	1	3	3
CO 4	2	2	3	3	2	3	2	2	2	1	2	2	2	2
CO 5	3	3	2	2	3	2	3	3	3	3	3	3	3	3

Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

If there is no correlation, put “-”

Books and references

- Social Network Analysis, Tanmoy Chakraborty, Wiley, 2021
 - Network Science, Albert-Lazzlo Barabasi
- Social Network Analysis: Methods and Applications, Stanley Wasserman, Katherine Faus

CRITERIA TO GET A CERTIFICATE:

Average assignment score = 25% of average of best 8 assignments out of the total 12 assignments given in the course.

Exam score = 75% of the proctored certification exam score out of 100

Final score = Average assignment score + Exam score

YOU WILL BE ELIGIBLE FOR A CERTIFICATE ONLY IF AVERAGE ASSIGNMENT SCORE $\geq 10/25$ AND EXAM SCORE $\geq 30/75$. If one of the 2 criteria is not met, you will not get the certificate even if the Final score $\geq 40/100$.

Certificate will have your name, photograph and the score in the final exam with the breakup. It will have the logos of NPTEL and IIT Kharagpur .It will be e-verifiable at nptel.ac.in/noc. Only the e-certificate will be made available. Hard copies will not be dispatched. Once again, thanks for your interest in our online courses and certification. Happy learning.